



A new
Method of Heating
which economically achieves
uniform, comfortable, healthful
Warmth
by scientifically utilizing
Induced Circulation of Air



A Concealed Type
which does not intrude upon the
Decorative Scheme nor usurp Floor Space



Cabinet Types
which afford all the advantages of the
Scientific Method and readily lend
themselves to any Decorative Treatment desired

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Bulletin No. 7

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Circulair Heat, Inc.

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Louisville, Kentucky

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New York

1916 Builders Bldg.
Chicago

Foreword

CIRCULAIR is a new *Method of Heating* which revolutionizes former conceptions of comfort, health, uniformity and economy. **Circulair** affords *real Heat Control*,—simple, positive, instantaneous!

Yet **Circulair** does not require expensive, complicated piping and auxiliary equipment but operates to full advantage when connected to the simplest of all systems,—the one-pipe steam.

Circulair Heat Control is independent of the heating medium, therefore the operation of the heating system is reduced to the simplest possible procedure.

And in addition to its many technical advantages, as set forth herein, **Circulair** adds to, rather than detracts from, the beauty of any Decorative Scheme.

Circulair is the *modern* heat, for both new and existing buildings of every type.

Guarantee

Circulair is guaranteed to deliver its rated B.t.u. capacities, when properly installed and operated, and to be free from any defect in material or workmanship.

Heat

Monarch of Comfort and Health when Winter comes

 N the "good old days" of the roaring log fire, man stood with his back thereto that he might intercept a portion of its radiant heat and benefit accordingly. This attitude became so familiar that even today men will stand thus before an empty hearth,—creatures of habit.

The open fire is homelike and cheerful, and comfortable enough for the man on the hearth, emitting much radiant heat in its immediate vicinity, but it is an impractical heating method because of its inefficiency, its troublesomeness, and the fact that radiant heat from a single source is incapable of heating the room *air* uniformly, invariably roasting the near objects and leaving the rest of the room cold.

What picture of a country grocery store would be complete without its circle of rural loafers around the old-fashioned pot-bellied stove, glowing red through the haze of corn-cob smoke?

These were the heating methods of yesteryear,—but a step from the open fire upon the earth floor of a cave. Merely the step of housing the fire that it might not ignite surrounding objects or the building itself.

Then some one put the stove in the cellar, surrounded it with an air casing and led ducts therefrom to the occupied portions of the building. This was an improvement in convenience and appearance, since the fire was all concentrated in one place and the living rooms were relieved of the stove itself. But it had other draw-backs, well known, of course, today, and it was a scheme unsuitable for tall buildings of many rooms. So the cast iron "radiator" was invented for these purposes and the stove in the cellar became a boiler,—transferring its heat to the many "radiators," by means of steam or hot water, through easily installed pipes.

This system was a real step forward, affording a reliable and cleanly means of distributing the heating *medium* to any desired point, and soon it was adapted to even the smallest homes.

The "radiator" era was begun.

And man soon changed his erstwhile habit of backing up to the heat source, because he noticed that the unsightly thing didn't sufficiently reward him for his pains. Who ever saw a be-slipped gentleman, in his lounging robe, with his favorite pipe aglow, standing contentedly and comfortably before—a cast iron "radiator"? It simply isn't done.

The poets tell us that this is because there is no ruddy cheerful glow to attract us. But the Engineers (the only real poets, anyway) tell us that it is because the "radiator" doesn't radiate!

And this, of course, is the answer.



Why the "Radiator" doesn't Radiate!

EXPERIMENTS,—business-like, technical experiments, devoid of the poetry of fancy, seeking only the real poetry of facts,—conducted by that able and unbiased body, the Research Laboratory of the *American Society of Heating and Ventilating Engineers*, proved definitely that the "radiator" doesn't radiate! Proved that less than 30 per cent of the heat emitted by the ponderous device is transmitted by radiation!

There is no mystery about this, even to the most fanciful poet, when it is remembered that *radiant* heat is, properly, not heat at all, but a form of dynamic energy transmitted in waves by the vibrations of a medium occupying space, which is converted into heat when the waves, or *rays*, are intercepted by a body capable of absorbing them.

Our own bodies are capable of absorbing radiant heat, as witness last summer's sunburn, but we are interested here in the capacity of that old-fashioned "radiator" to radiate such heat. The failure of the "radiator" as a radiator of radiant heat is due to the comparatively low *temperature* at which it operates, since radiant emission is proportional to the *temperature* of the heat source and is relatively ineffective unless the source is actually incandescent. The higher the temperature the greater the radiant emission. Thus man's age-old habit before the open fire or beside the red-hot stove.

And thus it is that because of its low temperature,—a mere 150° F to 200° F. as compared to the 1500° F. to 2000° F. of the open fire,—the "radiator" doesn't radiate,—very much.

Since it doesn't radiate effectively how *does* the "radiator" function?

What Conduction and Convection mean in Heating

BESIDES *radiation*, made a familiar term by the misconception of the unremembered iron-founder who cast the first "radiator," there are two other modes by which heat is transmitted,—*conduction* and *convection*.

And now the Engineers have shown that these are the methods by which the heating of our buildings can be accomplished most effectively,—provided, of course, that the heating device is intelligently designed to *utilize* these phenomena effectively. "Radiation" being thus the wrong way to go about it how can we utilize conduction and convection to accomplish uniform and economical heating?

Conduction is the transference of heat by *contact*, simply, though painfully demonstrated by plunging one's hand in too-hot water, or touching a piece of heated metal.



Convection is the distribution of heat throughout a fluid, liquid or gas, illustrated by the heating of water in a vessel, or of the air within a room. In the case of the water the heat generated beneath the vessel is transferred through the metal thereof and yielded to the contiguous water by conduction. Then the more remote water above is heated, also partly by conduction, but mainly by convection, the hotter water beneath tending to rise while the cooler water above sinks to replace it. The currents so produced in the liquid,—*convection currents*,—cause a movement thereof within the vessel, and this motion rapidly distributes the heat uniformly throughout the whole body of the liquid.

In the heating of the air within a room the action is precisely the same, the fluid being air instead of water.

How a Room is Heated

LET us consider what happens in a room heated by an old-fashioned cast iron "radiator," beginning with this because it is familiar.

The steam or hot water in the "radiator" heats the iron by conduction, mainly, being in contact with it, and then the iron is ready to heat the room. It does this 30 per cent, or less, by radiation, to the walls and objects within the room, *and 70 per cent by conduction*, because the air in contact with the iron surface acquires heat therefrom almost wholly by conduction, that acquired by radiation being entirely negligible.

As soon as the air in contact with the iron surface is heated it becomes lighter than the surrounding air and begins to rise, being replaced by the cooler air which falls as the warmer air displaces it. This movement of the air is *convection*, just as in the liquid, though faster since the medium is almost perfectly elastic, and the currents resulting are *convection currents*, just as in the liquid.

Thus it is apparent first, that the "radiator" is, in reality, 70 per cent or more a *conductor*, rather, and that the air in the room, though itself heated by conduction, diffuses or *distributes* the heat so acquired by *convection*!

It is also obvious that the air is heated mainly in the area directly *above* the "radiator" since the convection currents are upward and downward, having no *horizontal* component except that very slow and ineffective motion which may result at the ceiling when the rising warmest air forces the uppermost warm air to spread across the ceiling, since it has no other place to go. This is clearly demonstrated in Fig. 1, and it explains why a "radiator," *because it is not designed to utilize effectively the phenomenon of convection*, is prone to *overheat* the ceiling and leave you "out in the cold" where you stand upon or sit near the floor.

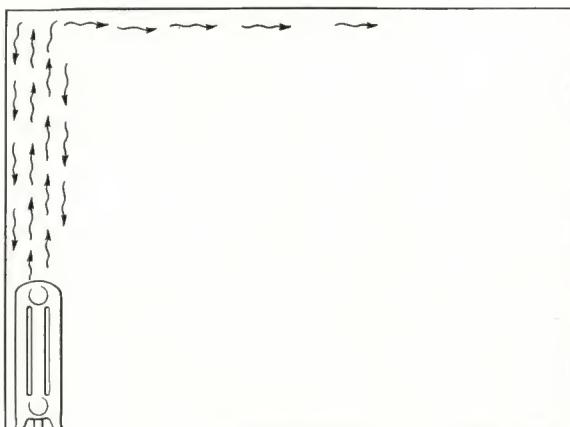


Fig. 1. Convection Currents set up by a "Radiator"

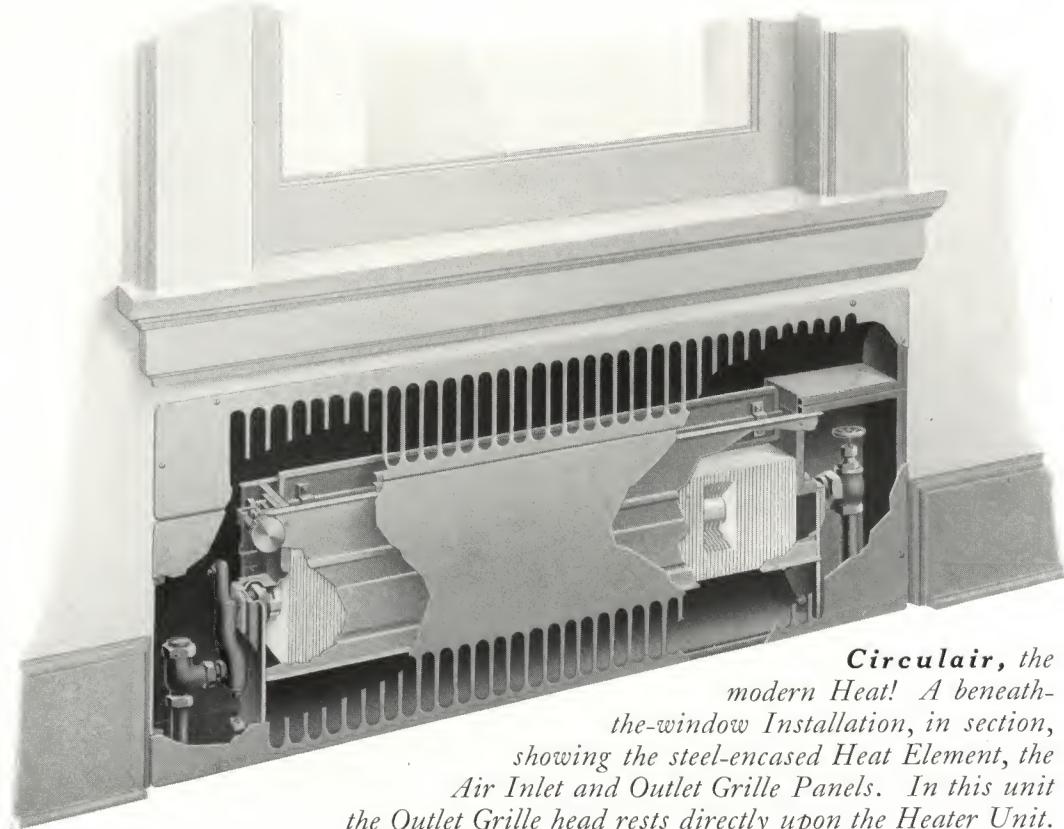


Now we perceive the relative functions and importance of radiation, conduction and convection, and we have shown that though convection causes a movement of the air it cannot, when created by a heater unequipped to *direct and utilize* the convection currents, accomplish uniform heating of the room and avoid excessive overheating of the ceiling.

We have seen, then, that the device which will most nearly approach the ideal room heater must be primarily a *conductor* of heat, rather than a "radiator" thereof, and must be designed to secure uniformity of heating by effective *utilization* of the rapid convection currents which its high conducting capacity can create.

Here, then, enters a new factor, which has to do with the uniformity of heating throughout all the space and the avoidance of excessive ceiling temperatures. Both of these fundamentally important objectives may be attained, obviously, if the heater is capable of sufficiently rapid *conduction* to create effectively rapid *convection* currents and then *utilize* these currents to cause a suitable *circulation* of the air in the room.

Circulation,—that is the new and important factor upon which depends uniformity and the distribution of the heat in the zone of occupancy rather than overhead. Circulation of the heated air throughout the room. Circulation of air. **Circulair!**



Circulair, the modern Heat! A beneath-the-window Installation, in section, showing the steel-encased Heat Element, the Air Inlet and Outlet Grille Panels. In this unit the Outlet Grille head rests directly upon the Heater Unit.



Circulair

HEATING Engineers of long experience, working in collaboration with Willis H. Carrier, the father of scientific Air Conditioning, with full knowledge of the fundamentals herein touched upon, have evolved a heating device which is specifically designed to transfer heat to the adjacent air by rapid and efficient *conduction*, this being, as pointed out, the most effective method, since air is an amazingly poor absorber of radiant heat and, in addition, high-temperature radiant heat sources are impracticable in modern buildings.

In this new and scientific device the heating element is so effective as a heat conductor that the air in contact with it acquires heat with great rapidity and rapid convection currents are set up.

These rapid currents are *directed* and *utilized* to produce an effective circulation of air within the room, thereby securing uniform distribution of heat throughout all of the space, avoiding overhead overheating and maintaining comfortable temperatures within the zone of occupancy,—the real objective of all heating.

This highly-developed device, which utilizes *conduction* to heat the air and *convection* to cause *circulation* of the air is called, logically, **Circulair**.

It brings a new era to heating, a new conception of comfort, uniformity, and economy.

And, as you will see, a new adaptability and a new beauty,—for **Circulair** is remarkably compact, due to its scientific design, and may be concealed in the ordinary wall, thus forever banishing the incongruous “radiator” of yore.

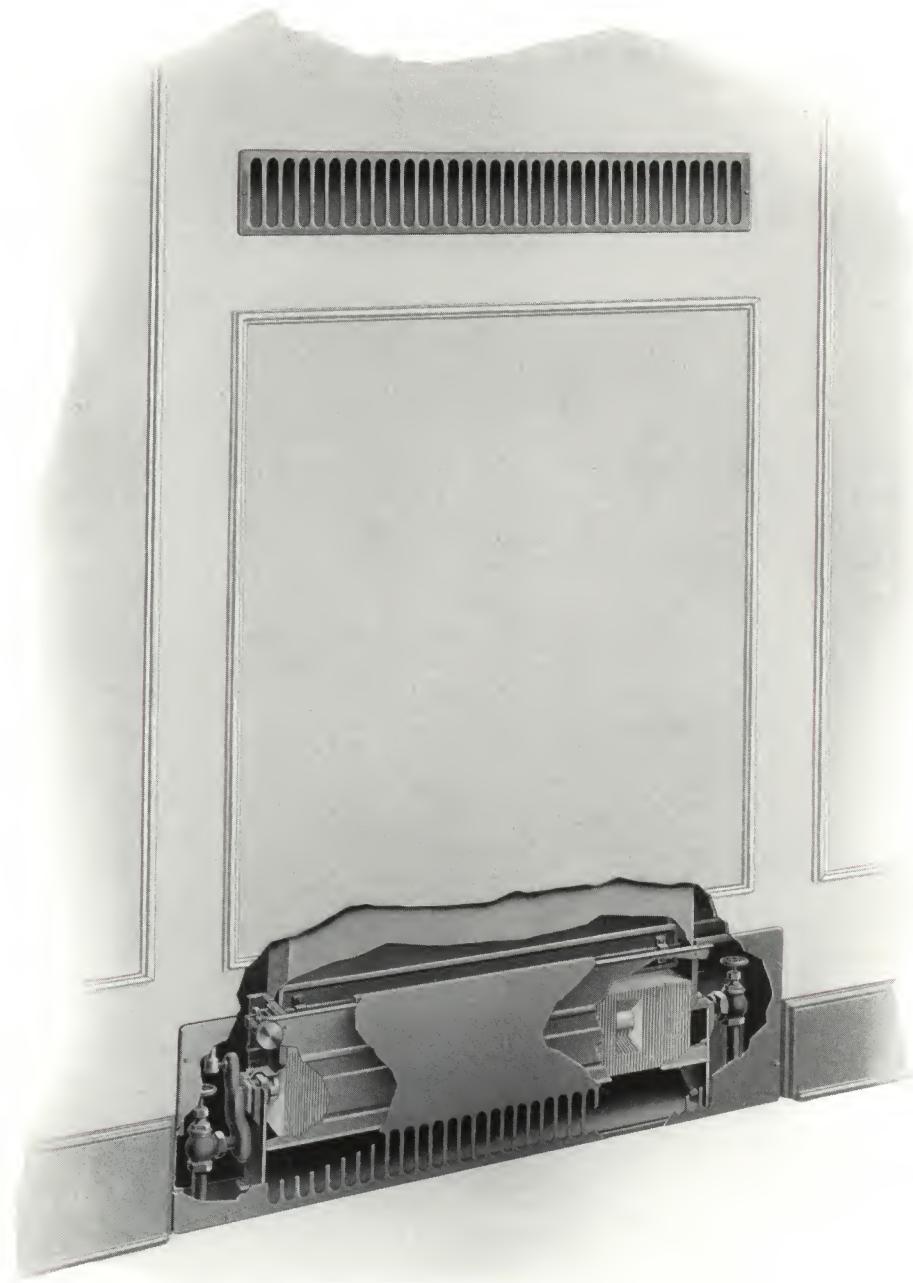
Circulair Heat Element

Effective Conduction

THE heat element or *conductor* in **Circulair** is but a fraction of the size of an iron “radiator” having equivalent heating surface, and it is built entirely of copper. Thus it is immune to corrosion, rust or scale and is capable of transmitting heat more than *eight times* as rapidly as iron.

Note in the illustrations that the primary surface is a straight, seamless *oval* copper tube, free from obstructions or recesses. This tube is drawn oval throughout its length and round at each end, the oval and the round being tangent at the bottom so that no pocket is formed which would trap condensation and impede quick, free drainage.

The tube is made oval for two important reasons. *First* the oval form permits expansion or deformation toward the cylindrical without imposing material stress upon the metal. The tube of the **Circulair** conductor may be *filled with water and frozen solid* without in any way injuring the element.



Concealed **Circulair**, 76 in. Stack Height, in partial section, installed
between the studs of an ordinary Wall.



The *second* reason for the oval tube is that its form more closely approximates the rectangular shape of the fins composing the extended surface than would any other shape except an actual rectangle of identical proportions. Thus the outer edges of the rectangular fins are practically equi-distant from the prime surface of the tube itself. This relationship was established after careful experiment and because of it every square inch of the extended surface is fully effective at all times.

The round ends of the oval tube are locked into bronze compression unions of special design, and these are drilled so that when the entire element is tinned by immersion the metal runs into the fitting and forms a true metallic union thus making the tube and its end connections an integral piece without a single joint.

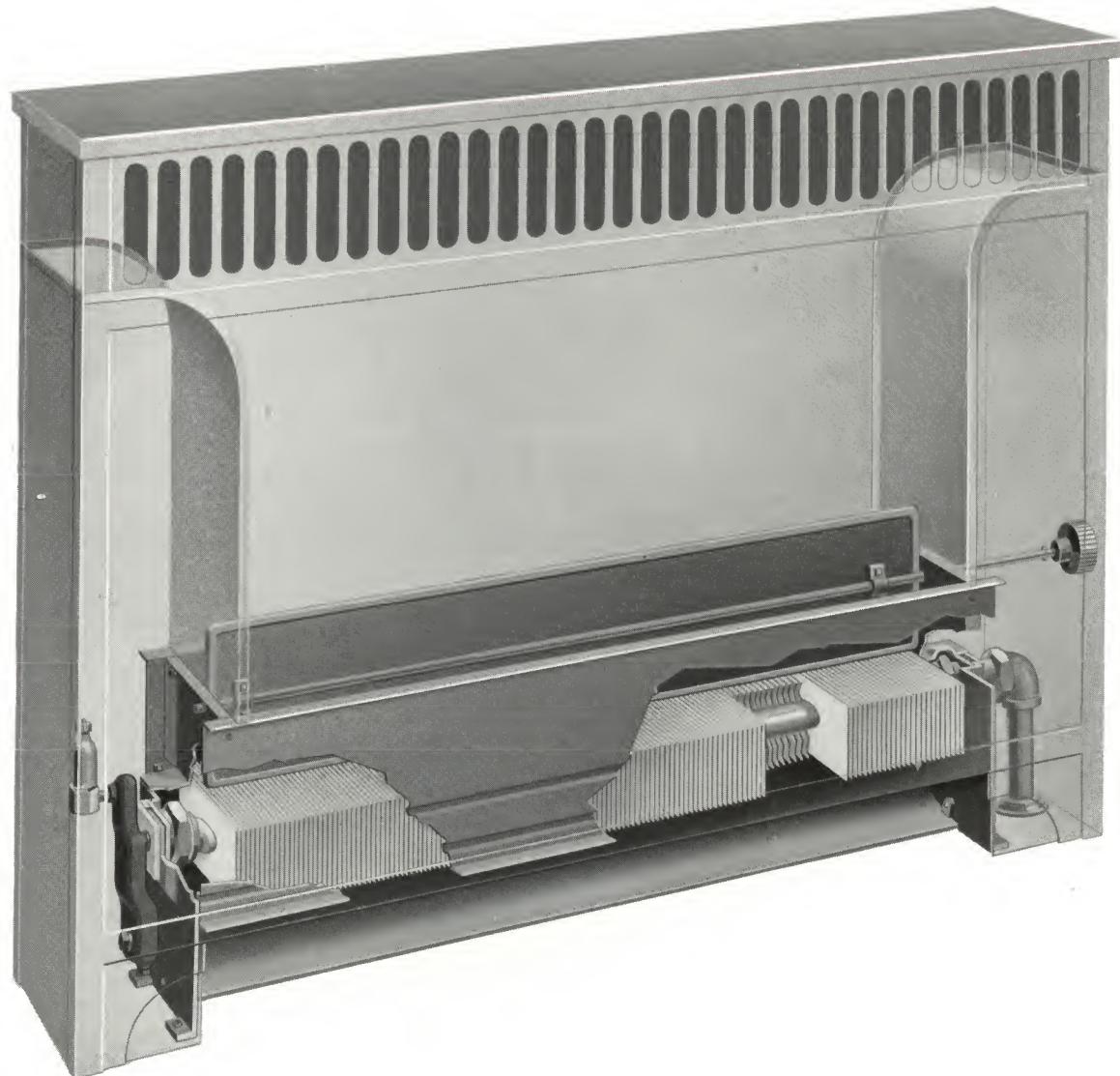
Before the oval tube is rounded at the ends for the application of the unions, the extended heating surface is applied. This extended surface is composed of a multiplicity of die-stamped copper plates or fins pressed tightly over the tube, spaced about one-sixth inch apart.

The fins are stiffened by carefully designed beading which serves the further purpose of "rolling" the many thin air streams gently across the surface so that all of the air is brought into intimate *contact* with the surface, thus permitting rapid *conduction* of the heat to the air.

At each of the four outer corners of the fin and at the center of the long sides, a spacer is stamped out at right angles, insuring uniform spacing and fixed rigid interlocking of all the plates, so that the surface *remains* capable of maximum heat transmission, and is not injured or deformed in transit, handling or connection.

When the oval hole is stamped in the copper fin a collar is set out at slightly less than a complete right angle so that when forced on the tube this collar will fit closely. The extension of the collar is the same as that of the edge spacers, hence the plate is further held in its correct position by the collar. Besides its spacing function the collar provides an additional area of contact between the fin and the tube and since the collar of one plate is pressed against the adjacent plate the whole area of the oval tube is in metallic contact with the extended surface.

This construction is, in itself, so carefully designed and executed that without further treatment the element is exceedingly effective. But not as effective as if the extended and prime surface were *metallically integral*. Heat is conducted through metal in the same manner as electricity. The heat-conducting power of metals varies, just as their electric conductivity varies. It has previously been pointed out, for instance, that the copper tube and fins of **Circulair** conduct heat eight times as rapidly as iron,—just as copper conducts electricity some six times as well as iron. And, also, as with electricity, the flow of heat is retarded if the metallic path is interrupted by a juncture at which the contact is imperfect in the slightest degree. The flow of electricity is so seriously impeded by poor contact that, as a universal practice, the mere metal-to-metal contact secured by twisting together the ends of wires is never trusted. The wires are *soldered*, being made thereby permanently and *metallically integral*.



Circulair in Cabinet Form, making all the advantages of the scientific **Circulair** Method available to Owners of existing Buildings. The Cabinet may be connected to the present piping in place of the old-fashioned "radiator."



And since the flow of heat is affected by poor contact just as is the flow of electricity, so also is the **Circulair** heating element "soldered" by dipping in a molten metal, thereby making its extended surface actually metallically integral with the oval tube prime surface.

Not only does the tinning of the entire element guarantee perfect heat conductivity as no mere mechanical contact can, but it assures, also, the *permanency* of this high conductivity, insuring against that decreasing efficiency in service to which the unit would be subject were it left as an aggregation of surfaces in mere mechanical contact rather than made into a single metallic unit by the actual bonding of its initially separate parts, thus avoiding either separation or insulation of the extended from the prime surface due to the accumulation of dust in unsealed crevices.

And the tinning affords yet another advantage. It produces a surface which does not corrode nor gather *verdigris*, the "green rust" of copper, and is so smooth that dirt or dust does not collect.

Thus the **Circulair** heat element is not only exceptionally efficient as a conductor of heat, but it is entirely non-corrosive, cleanly and *permanent*.

Circulair Housings

Induced Circulation

THE effective conductor or heat element is the first step toward the dependable, economical and beautiful heating system which is **Circulair**. The final step involves the scientific application of the heat element that its maximum heating capacity may be utilized and that sufficiently rapid convection currents may be induced to afford that *circulation* of the heated air upon which uniform heating depends.

Everyone knows that the log fire, mentioned earlier in this writing, creates an upward current in the chimney above it and that this *stack-effect*, as the Engineers call it, becomes greater as the fire and the chimney become hotter, because it is the natural tendency of heated air or gases to rise. In fact the stack-effect induced in a good chimney by a roaring fire is so great that it will draw into the fire-place the tobacco smoke of those sitting a considerable distance away.

The stack-effect is a convection current induced by the difference in temperature within and without the chimney. The intensity of the effect depends upon the degree of this temperature difference and the height of the stack,—the greater the temperature difference and the higher the stack the more the stack-effect.

Circulair utilizes this principle to achieve both its remarkable heating *capacity* and that prerequisite *circulation of air*.

Note in the illustrations that the heat element is located at the base of the housing or *stack* just far enough above the bottom to provide for the lower or entering air grille. Thus the maximum *height* above the heater is obtained, this being the first factor in the production of a usable stack-effect. Even in the low beneath-the-window sizes of **Circulair** the placement of the heat element is such that the stack height is enough to induce an effective circulation.



The Tall Shallow Cabinet **Circulair**, which extends but 4 in. beyond the Wall. Beautiful, lending itself subtly to any Decorative Treatment, the Tall Cabinet (Stack Heights to 80 in.) brings the boon of **Circulair** to those owning existing Buildings. It is no longer necessary to suffer the discomforts of the ponderous, unsightly cast iron "radiator."



The second factor in the production of the desired stack-effect is temperature. The conducting power of the heat element is very great and it transfers the heat with extreme rapidity, because its fins or conducting surfaces are made of copper, having that very high coefficient of heat-transmission, and because these fins are accurately spaced to break the air into many thin streams, every part of which is brought into intimate contact with the heating surface.

Thus the air, even during its amazingly short travel between the plates is brought very nearly to the temperature of the fins themselves and these, in turn, because of their great heat-conducting capacity are always, even at the farthest edges, nearly at the temperature of the steam or hot water within the oval tube. Hence the air leaves the conductor at a temperature very close to that of the heating medium itself, and because *all* of the air must pass through the closely housed heat element this temperature is not reduced by the admixture of any unheated air whatever.

Thus the **Circulair** housing, whether the Cabinet or Concealed Type, induces the most rapid circulation which is possible with the given height and temperature of heating medium.

The rapid circulation enables the compact heat element to yield its surprising quantity of heat because it brings a large quantity of air into contact with the heating surfaces, and, in addition, this rapid circulation is the means whereby the heat is distributed uniformly throughout the room, without excessive overhead overheating.

Figure 2 shows in diagram what **Circulair's** circulation of heated air accomplishes in the room itself. Air enters through the grille at the bottom, being *drawn* in by the stack-effect, is heated quickly as it passes through the heater, and issues *horizontally* from the outlet at the top, with sufficient velocity to insure effective *circulation* throughout the room.

Although the velocity induced in the stack of **Circulair** is sufficient to insure uniform distribution throughout the whole room this velocity is not great enough to affect the occupants of the room as a noticeable draft, in fact the uniform, controlled *circulation of the warmed air* prevents the "floor drafts" of cold air that sweep across rooms heated by devices which permit the immediate rising of the heated air and its accumulation at the ceiling.

As the heated air leaves the upper grille of the **Circulair**, and passes across the room, it diffuses or mingles with the room air, its temperature being lowered thereby to that desired in the zone of occupancy. Then the correctly tempered air is drawn gently back across the room, through the zone of occupancy, and again enters the **Circulair** to repeat its function as a distributor of comfortable, uniform warmth.

Circulair! Comfort, health, uniformity!

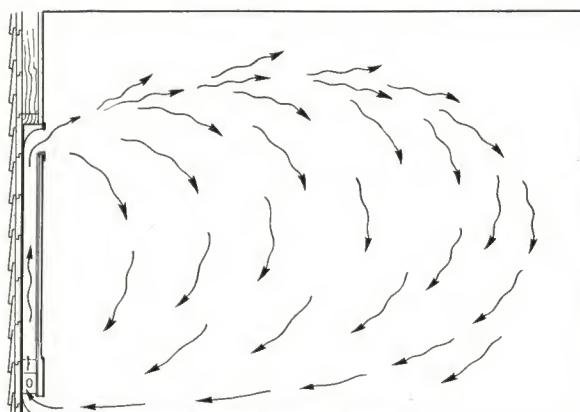


Fig. 2. Circulation of Air with **Circulair**



Economy of *Circulair* Uniformity

CIRCULAIR effects its unusual *economy* by avoiding excessive overhead overheating and maintaining a uniform temperature throughout the room without causing materially higher temperatures in its own immediate vicinity.

This minimizes heat loss from the building, thereby saving fuel, because the loss of heat through the ceiling is much less at the lower ceiling temperatures achieved by **Circulair** and the loss through the wall, in which or near which the **Circulair** is installed, is much less than with the old-fashioned "radiator" because the Concealed Type may be and should be effectively insulated against such loss while the Cabinet Type avoids this loss by projecting the heated air out into the room *away* from the adjacent wall, so that this wall is not heated to a temperature much higher than that being maintained in the zone of occupancy itself, and hence the loss through it is minimized rather than multiplied as by a "radiator."

Thus, circulation of the heated air affords not only comfortable uniformity but a material economy, as well.

Circulair!

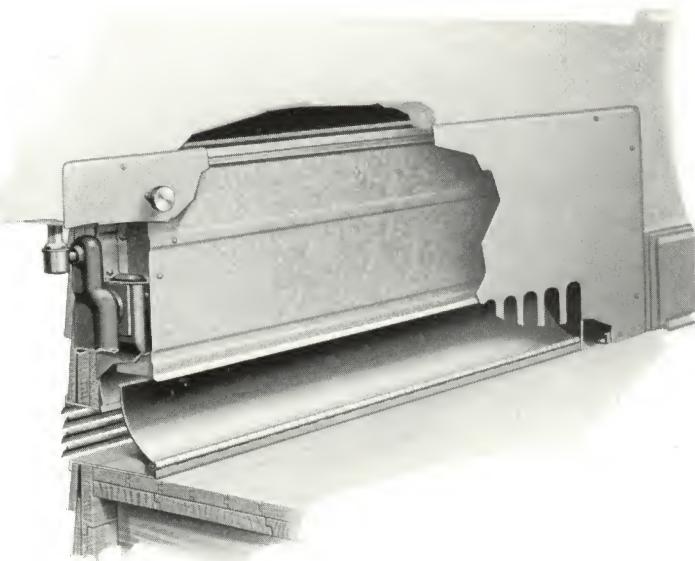


Fig. 3. **Circulair** with Integral Fresh Air Damper.
Controllable Ventilation as well as Controllable
Heat! See next Page.



Fresh Air with *Circulair*

Health and Real Comfort

*I*n most heating systems, except those involving costly mechanical means for obtaining circulation, the fundamental problem of fresh air has been completely neglected, so that the user has been forced to employ the expedient of opening windows, transoms, or doors, thereby suffering from uncontrollable drafts, flying snow or rain, and being generally discomfited.

Not only does the window opened "just a crack for ventilation" create dangerous drafts and often render its immediate vicinity untenable, but such introduction of cold air, willy-nilly, may so disturb the conditions within the room that uniform heating becomes impossible.

So in the Concealed ***Circulair*** provision is made for fresh air in a manner as scientific and effective as the principles employed for economical and uniform heating. The fresh air is introduced through the ***Circulair*** itself! By means of a simple, easily adjustable damper behind the grille beneath the heat element. (Fig. 3.)

When ***Circulair*** is installed in an outside wall, positive, controlled, draftless introduction of fresh air, which does not in any way disturb the uniform heating of the room, may be secured by providing, behind the unit, beneath the Fresh Air Damper, an opening through the wall to the outside. The wall opening should, of course, be provided with one of the several standard weatherproof grilles, to prevent the entrance of rain or snow. So installed ***Circulair*** becomes a scientific ventilating system as well as an efficient heating system.

In extreme weather, or when desired, the Fresh Air Damper may be closed, whereupon ***Circulair*** circulates room air alone. Under the more normal conditions of outdoor temperature, conditions which obtain for nine-tenths of the time, the Fresh Air Damper may be adjusted to admit that percentage of fresh air desired and left in this position.

Whatever the conditions, whether in home, office or apartment building the conveniently adjustable Fresh Air Damper meets every requirement and affords, at last, a really controllable, practical, and scientific means for the introduction of fresh air without drafts and without disturbing the uniformity of heat distribution in the room.

This controlled ventilation (Patents pending) is an exclusive feature of ***Circulair***,—the *modern heat*.

It is a boon in the office where the occupants are usually close to the windows and even a "crack" of an opening results in dangerous and disordering drafts. It is a tremendous attraction in the apartment building, where arrangement makes window ventilation especially difficult and unsatisfactory. It is a joy in the home, where it assures constant healthful comfort and obviates the troublesome necessity of frequently readjusting the window openings.



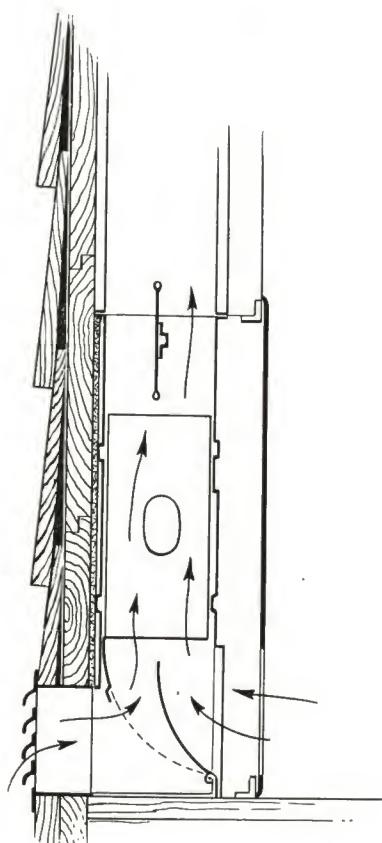
And **Circulair** Controlled Ventilation is economical, too, because it entirely avoids the frequent "airings" required with old-fashioned heating systems to prevent "stuffiness" in the rooms. Such "airings," achieved by the opening of windows, lose great quantities of heat and so chill the room that further quantities must be supplied in order to restore the temperature. **Circulair** introduces the proper volume of fresh air continuously and smoothly, without chilling the room or permitting the escape of heat to the wide outdoors. The resulting economy merits, especially, the thoughtful consideration of the apartment or office building owner.

In separate offices every **Circulair** should be provided with the Fresh Air Control, and this may be done even when the **Circulair** is installed in an inner wall, if a small duct can be run to and through a nearby outer wall. Our Engineers will be glad to discuss this with any Owner, Architect or Heating Engineer.

In apartments or homes it is usually adequate to provide the Fresh Air opening only in connection with those **Circulair** units installed in outer walls and, in some cases, but two or three of the units need be so equipped, these affording sufficient ventilation for the whole apartment or dwelling.

In homes it is feasible and sometimes desirable to introduce fresh air to those **Circulair** units on the first floor, through basement ducts brought up through the floor, these small ducts having a common connection to the outside through the cellar wall. **Circulair** is so adaptable that almost any requirement or condition can be met practically and effectively.

Circulair may be had with or without the Fresh Air Damper, as desired, hence the Architect or Engineer may exercise his own ingenuity in the arrangement of the equipment to meet the given requirements.



*How the **Circulair** Fresh Air Damper affords Controllable Ventilation.*

Heat Control with *Circulair*

*W*ITH old-fashioned exposed "radiators" the *control* of the heat presented an extremely difficult problem, and many "systems" of steam piping, valves and traps were developed in efforts to afford some degree of regulation or modulation.

All of these systems, no matter how ingenious, were defeated, in large measure, by the "radiator" itself, because of its great mass of iron, which made its response to control extremely slow, and because of its inability to cause *circulation* of the room air, so that other methods of regulation were attempted,—usually the opening of windows.

In fact, the difficulty of regulating steam systems led to the development of the slower but more uniform hot water system.

This also presented many difficulties as to heat regulation because of the large volume of water in each "radiator," which responded even more slowly than the steam, though it varied less extremely.

All of us are familiar with the erstwhile difficulties of heat control. Even with methods of controlling the heating *medium*, the sluggish response of the "radiator" itself made it a long and unpleasant process to "heat up" in the morning or to "cool off" later on when the temperature had risen too high, as it invariably did, except on the coldest days, when it was impossible to heat the room uniformly.

Apartment dwellers are especially aware of these heat difficulties of yesterday. Few apartments were equipped with the expensive auxiliary traps and valves of special systems and hence the heating was left to the janitor or superintendent who did the best he could under the circumstances—which were all against him!

Having usually a one-pipe steam system with cheap and uncertain air valves he knew that his tenants had either to turn the radiator on or off, since there was no intermediate alternative. And if he were experienced he knew that they usually left the steam on and opened windows when they finally became overheated, rather than wait for the slowly-responding radiator to cool or chance the inability to heat it up again later when the steam pressure became less or vanished altogether. So the poor janitor, wotting little of thermal science, if anything, and pressed by his employer, endeavored to minimize fuel consumption by manipulation of the boiler in the basement. He fired up right tolerably in the morning to conquer the night's frigid air and then he let the pressure down, to keep tenants from opening windows. Sometime in the afternoon he fired up a bit, after the first few complaints, and again a burst during the evening just before he "banked her" for the night, forcing everyone in the building to go to bed or freeze,—whether or no the evening were young and gay.

So dwellers in "radiator"-heated apartments were in the hands of the janitor. They were heated according to *his* judgment (or instructions). They were alternately driven to window-opening by enervating, depressing, uncontrollable overheating or to window-closing and periods of shivery waiting for the steam to "come up again."



You couldn't altogether blame either the janitor or the owner. It was the method. Of course any owner who *repeats* the offense in future must suffer the consequences.

And even in private homes, "radiator"-heated, the situation was little better, since with a one-pipe system the "radiator" had to be left either on or off, while with a "vapor" or "vacuum" system to regulate the heating *medium*, the aforementioned sluggishness of response, due to the great mass of the "radiator," made uniform regulation impossible.

But **Circulair** emancipates us from these discomforts of yesterday. For **Circulair** affords a *real* heat control, simple, positive, easily manipulated, and *instantaneous!* A heat control, not an attempted heating *medium* control, but a direct control of the volume of heated *air* circulating throughout the room.

Note in the illustrations that immediately above the heat element at the base of the unit, Cabinet or Concealed, there is a volume damper. This is the heat control. It is entirely independent of the heat element and acts directly upon the *air* itself.

When the damper is moved the volume of air discharged from the **Circulair**, and hence the quantity of heat conveyed to the room, is affected *instantly*. Thus response is *immediate*. And since the damper may be moved, by means of the convenient knob shown, to any desired position, between fully closed and fully opened, any quantity of heat desired, from none at all to the full capacity of the unit, may be released to the room.

This is *real* heat control. Instantly effective. Positive. Infinitely variable between none and all, as required. By the simple turning of the knob. No sputtering, hot valve to struggle with, no waiting for the whole heating system to readjust itself. As effective as it is simple.

Thus, with **Circulair**, the era of alternate overheating and underheating, window-opening and window-closing in frantic efforts to regulate the temperature within the room, ends. And the new era of really controlled heat, with all that implies in comfort, health and economy, begins.





Economy of *Circulair* Heat Control

*W*HAT real heat control means to comfort and health, in office, apartment or home, must be clear to every survivor of old-fashioned heating methods, but what it means in economy will bear a word of suggestion, perhaps.

Circulair may be used with any system one- or two-pipe steam, vapor, vacuum or hot water. But since **Circulair** is in itself so scientifically designed and embodies a heat control entirely independent of the heating *medium*, the simplest and least expensive of all heating "systems," the one-pipe steam, affords results better than those obtainable with the most complicated and costly "systems" developed to combat the deficiencies of the "radiator." Thus there is a considerable saving in initial cost of the installation, though **Circulair** itself is, of course, more costly than the mere "radiator" it supersedes.

Circulair may be installed without individual valves at the units, valves being placed only on the risers in the basement, and used only when it is desired to close the line for repair or some unforeseen contingency. When valves are used on risers an ordinary gate valve, the cheapest type available, is not only adequate but especially recommended, since it affords full, unrestricted opening.

Any type of air valve may be used with **Circulair's** simple one-pipe steam supply, either the ordinary air valve or the air and vacuum valve which prevents the return of the air to the system, thereby saving fuel and keeping the most remote **Circulair** as warm as that nearest the boiler, an extremely important consideration in large buildings, such as offices and apartments or extensive homes. Even **Circulair** will fail if no steam reaches the heater because it is full of air and the pressure at the remote points is insufficient to expel it.

If air and vacuum valves are used, as is always best, regardless, of the type of installation, **Circulair** again meets the requirements notably. Unlike the "radiator", which should have an expensive packless valve when used on a vacuum-type system, because the valve must be manipulated whenever conditions are uncomfortable, **Circulair** requires, even on the vacuum-type system, only the inexpensive radiator valve, since the valve is not used for heat control and the packing gland may be turned tight in the open position and left there.

The real economy of scientific heat control has to do with the avoidance of overheating and window-opening. These are the two most serious losses resulting from ineffective heat control. Overheating causes in itself a material loss, due to the greater transmission through walls and ceilings. When overheating is combated by the opening of windows, the loss is, obviously, multiplied manyfold.

Heat control is so simple and instantly effective with **Circulair** that overheating is avoided and the frenzied expedient of the wide-opened window is never necessary.



This is an important economy consideration in every installation, large or small, but it is of paramount importance to the owners of large buildings, offices, and especially apartments. This economy of **Circulair** is so material that the owner of an existing "radiator"-equipped apartment or office building may well consider the *replacement* of the "radiators" with Cabinet **Circulair**, which affords not only these economies but saves frequent redecoration and adds mightily to the tenant-attraction and rental value of every apartment or office.

Circulair, though independent of the heating medium as to control, of course depends upon it as to operation, since it cannot heat the circulating air unless the heat element is itself heated. But observe how **Circulair's** independent heat control simplifies and standardizes the operation of the boiler itself.



Concealed **Circulair** in an unusual Living Room.

(At the right.) Note how perfectly it harmonizes with the Room itself and the Furnishings.



Heretofore, with "radiators," uncontrollable in themselves, it was necessary to attempt regulation of the fire in the boiler in accordance with the heat demand, since an insufficient supply resulted in underheating, some of the radiators being cold, while an excess supply caused overheating because every radiator then became too hot. Every home owner and apartment dweller knows this.

Not so with **Circulair**, because it is really controllable at the unit itself, and its heat delivery is but little affected by a considerable variation in the boiler condition *provided only that the supply at the units is always sufficient to meet the demand*. Hence this minimum demand-supply may be maintained at all times, without overheating or waste, any increase in supply above the minimum required for the given system having practically no effect upon the heat delivery from the **Circulair**, since this depends upon the *volume of air* passing over the heater, and this is fixed by the position of the heat control damper.



*And in the carefully planned Bed Room Concealed **Circulair** "belongs" also, as you see.
Unobtrusive, effective, modern.*



If the steam pressure exceeds that required for the given heat load, as fixed by the control damper, there is slight if any effect upon the quantity of heat delivered to the room. This is true because at any damper opening, from closed to full, *provided the minimum steam pressure is available*, the air leaves the **Circulair** heat element at approximately the same temperature, closely approaching that of the steam itself. Since the steam temperature increases only about 3 deg. per pound of pressure an increase of several pounds in steam pressure has but slight effect upon the temperature of the air leaving the heater. The *quantity of heat* delivered to the room is, of course, a function of the *temperature and volume* of the air being delivered from the **Circulair**. Since the temperature of the air varies so slightly the principal factor is its *volume*, and this is controlled easily and positively by the heat control damper.



*Another Living Room, built back in the era of "radiators" but saved from their discomforts by the simple expedient of connecting a Cabinet **Circulair** to the existing piping.*



Circulair, regardless of the steam pressure (within the ordinary limits, of course) takes only that amount of steam required to heat that volume of air which the heat control damper permits to pass through the unit. If more steam than this is available it simply remains in the heater ready to furnish more heat instantly if the control damper should be opened wider at the desire of the room occupant.

Should the damper, close-fitting and provided with a flexible, durable, non-sticking sealing material at the edges, to insure complete closure, be closed, the **Circulair** instantly ceases to deliver air and, consequently, ceases to deliver heat. The heater, however, remains hot, so that when the control damper is opened again the **Circulair** delivers heated air as *instantly* as it ceased to deliver it when the damper was closed.



*A paneled Dining Room in which Concealed **Circulair** is as much at Home as the Host himself.*



When the heat control damper is closed, though the steam remains full on and the heater as hot as ever, there is practically no heat emitted since the air about the heater is trapped and cannot move upward as it tends to do. Hence this small volume of air remains at the steam temperature, delivering no heat to the room except that negligible amount radiated thereto through the small area of wall in front of the heat element itself.

Circulair's scientific means of controlling the heat delivery without restricting or stopping the flow of the heating medium itself, permits the steam system to remain always in "balance," that is, always free of water and air, since the heater itself does not become cold, and re-fill with air, hence there is no air to vent when more heat is required and there

is no trapping of condensation in the heater and sudden excess of condensation as when steam is admitted to a cold "radiator." This is one of the important reasons why **Circulair** operates so successfully when connected to the simplest one-pipe steam system.

Think what **Circulair's** positive, independent heat control means to convenience, besides its demonstrated factors of comfort, through uniformity and effectiveness, and economy, through avoidance of alternate extremes and frequent overheating!

Instead of constantly fussing with the boiler in futile efforts to effect some sort of control in this manner, the boiler is fired only as fuel is required and the simple steam pressure draft damper regulator, which is furnished with most boilers, is all that is needed, since this will hold the pressure close enough for **Circulair**, which is substantially unaffected by a pressure variation of several pounds at the boiler.



*A stately Stairway saved from the unsightly incongruity of a "radiator" by Concealed **Circulair**.*



Real convenience at last!

Think what this means to the home owner. Convenient, simple, normal operation, without the necessity of periodic "firing up" or "banking" at the boiler. And real economy through the avoidance of such inefficient extremes.

Think, further, what this means to the owners of office or apartment buildings, large or small. Instead of dependence upon the janitor's judgment, complaining tenants, and the very great loss through alternate under- and overheating, a steady normal demand, positively and instantly controllable by the tenant to meet the precise requirements of



*In existing Hospitals and other Buildings of similar character the Tall Cabinet **Circulair**, especially when provided with the Fresh Air Damper, is worth its weight in gold, affording Controllable Ventilation as well as Controllable Heat.*



the weather. Instead of constant periodic overheating on mild days, with the consequent owner dissatisfaction and the great loss occasioned by promptly opened windows, *since the tenant has no other recourse with uncontrollable heat*, **Circulair** is so easily and positively adjustable that overheating is prevented, tenants are boosters and a very material economy saves many owner dollars.

Again we remind you, that even in existing buildings the advantages of **Circulair's** convenience, comfort and economy are available to prescient owners through the two Cabinet Types. This is well worth investigating, through your Heating Engineer, your Architect, or by inquiry directly to us.



*The Tall Cabinet **Circulair**, inconspicuous and quite harmonious, bringing the joys of Controllable Heat to an imposing Dining Room.*



Economy of Floor Space with *Circulair*

HERE is yet another economy with **Circulair**. The Concealed and tall shallow Cabinet Types save floor space,—the Concealed Type uses none at all and the tall, shallow Cabinet Type uses about one-half that occupied by a “radiator” having “equivalent” square feet of surface.

In addition to the *actual* floor space saved **Circulair** saves several times this amount by rendering *usable* all of the *adjacent* floor space, since **Circulair** does not radiate to persons nearby, this being prevented by the insulation of the front panel in the tall Cabinet Type,



*A Dormitory Bed Room in which Tall Cabinet **Circulair** saves Floor Space in itself and, what is more important, salvages the adjacent space which a “radiator” would make most uncomfortable.*



and by the building wall itself in the Concealed Type. Nor is the heated air itself discharged directly against persons standing or sitting near the **Circulair**, since the outlet grille of the Concealed Type may be, and usually should be, placed above the head of a person standing. The tall shallow Cabinet Type is less than 4 in. deep and may be had in various heights, but is standardized in the 80 in. stack height (86 in. from floor to top) this being an efficient height from the operating standpoint, as discussed later, and sufficiently high to prevent the discharge of heated air directly upon the head of a person standing or sitting beside the **Circulair**.

Floor space cost dollars per square foot, depending on the type of building. Considering the space alone **Circulair** saves, on this basis, more than the difference between its unit cost and that of the "radiator" it supplants.

But the saving of *adjacent* floor space is far greater.



*Man's age-old desire to have his back to the wall, especially the outer wall through which the sunlight streams, makes Restaurant wall-space the most valuable of all. Here Tall Cabinet **Circulair** affords uniform, controllable heating, yet does not overheat those fortunate enough to secure tables near that desirable outer wall.*



Salvaging Unusable or Uncomfortable Space with *Circulair*

*S*N the new home having either the Concealed Type, or in the modernized existing home having the Cabinet Types, especially the tall Type, which extends but 4 in. beyond the wall, all of the floor space is usable, since furniture may safely be placed directly against the wall or the Cabinet, without danger of warping or separating the wood and without impairing the heating effectiveness of the

Circulair, so long as the bottom entering air grille is not covered. Even a chair or a bed may be placed beside the **Circulair** without overheating the occupant. **Circulair** makes *all* of the adjacent floor space *usable*.

In small offices, hospital rooms, and similar applications, the space-saving advantages of **Circulair**, Concealed or tall Cabinet Type, are obvious, besides the paramount comfort and health advantages of uniform, controllable heat.

In large lobbies or areas such as banking floors the Concealed or tall Cabinet Types of **Circulair** are especially desirable, even though space-saving may be less important, since they do not overheat persons walking by or standing beside them, a familiar discomfort of former exposed devices.

In restaurants and large dining rooms, where wall space is the most valuable of all, the Concealed or tall Cabinet **Circulair** is indispensable. With either Type a table may



*How easily a Cabinet may be exchanged for the discordant "radiator," lending beauty and affording **Circulair's** wonderful heat control.*



be placed directly against the **Circulair** without discomfort to those sitting thereat. The valuable wall space of existing restaurants may be quickly reclaimed and utilized by the installation of the tall Cabinet Type **Circulair**, the units being connected directly to the existing piping.

Wherever the floor space occupied by a "radiator" and that *adjacent* thereto is especially valuable, or wherever arrangement brings discomfort to certain individuals because they must, of necessity, be located too near a "radiator," the simple, quickly achieved solution is the replacement of the offending "radiator" by the tall Cabinet Type **Circulair**, which does not overheat its immediate vicinity.



The first of two "before-and-after" photographs. In this otherwise delightful Office exposed "radiators" suffocatingly overheat those forced to sit nearby.



Even when the offending "radiator" is beneath a window, where the tall Cabinet Type **Circulair** could not be placed, the problem is not at all complicated. By merely extending the steam pipe, either above or below the floor, the tall Cabinet **Circulair** may be installed against the nearest available windowless wall space or against a nearby inner wall.

The tall Cabinet **Circulair** (Patents pending) renders all of the advantages of the scientific **Circulair method** available to existing heating installations of every description. The ponderous, bulky, unsightly "radiator" which renders untenable all of its immediate vicinity, may be replaced by the unobtrusive, beautiful tall Cabinet Type **Circulair**, which not only affords uniformity, comfort, convenience and economy but reclaims *all* of the space in its immediate vicinity.



But observe this "after" photograph. Now Tall Cabinet **Circulair**, discharging its easily controlled warmed air overhead, heats the whole Office uniformly, to the indescribable comfort and efficiency of its Occupants. So simple, by merely connecting **Circulair** to extensions of the old Piping.



Circulair and Beauty

*J*T is a saying that, in design, science and beauty go hand-in-hand. This is joyfully illustrated in **Circulair** which in addition to its advantages in comfort, uniformity of heating, convenience and manyfold economy, is truly beautiful when installed.

The Concealed Type **Circulair** effaces itself completely, except for the attractive entering and outlet air grilles at the bottom and top, flush with the wall itself and subject to precisely the same decorative treatment as the wall itself. Thus the Concealed **Circulair** does not intrude upon the decorative scheme at all, but readily adapts itself to any effect which may be selected.

The bottom and top grilles are usually furnished with a flat prime paint coat, so that when installed in the wall they may be finished when the rest of the room is decorated.

When the Concealed Type is to be placed in paneled wood walls the grilles can be furnished in a matching grained finish, on special order. The Concealed **Circulair** forever banishes the necessity of employing the incongruous, unsightly devices heretofore the despair of the Architect, the Decorator and the Owner, alike.

Cabinet Types

*T*HE Cabinet Types of **Circulair**, both the regular and the tall shallow Type, are also furnished, usually, with a flat prime paint coat for finishing, as required, at the time the room is decorated, or, in case of replacement of an existing "radiator," for decoration after installation in accordance with the existing requirements.

When mahogany, oak, walnut or other wood finishes are desired on Cabinets these can be furnished promptly on special order, our shops being fully equipped to produce the highest grade finishing of this nature.

Thus the Cabinet Types of **Circulair** are perfectly adaptable to any decorative scheme and are the means whereby the Owners of existing buildings may avail themselves of every **Circulair** advantage. Since in addition to comfort and beauty, a **Circulair** Cabinet, when connected in the place of an ordinary "radiator," even on the simplest one-pipe system, affords the joy and economy of real heat control,—simple, positive, flexible, *instantaneous*,—such replacement is a sound and profitable investment in any type of building, from the small residence to the skyscraper apartment or office building.



Circulair Cleanliness

*F*IRST of all **Circulair** itself is clean, since the smooth, bright, tinned fins and the stream-line oval tube, free from crevices of any kind, do not collect the fine dust suspended in the air stream and the heavier dirt particles which gather at the floor are prevented from entering the unit.

In the case of the Concealed Type the lower or entering air grille is solid for a distance of 1 in. above the floor so that dirt or dust cannot be swept into the grille.

In the case of the Cabinet Types, as shown, there is no lower grille, the front panel of the Cabinet ending a few inches above the floor, leaving a clear opening for the entering

air and affording convenient access for cleaning. Note that the lower edge of the curved entering air deflector rests firmly against the floor so that dirt cannot collect beneath or behind it.

Then, in addition to its own features of cleanliness, **Circulair** does not soil the wall, ceiling or draperies above it, because it projects its stream of warmed air horizontally forward *away from the wall* in which or beside which it is installed. This advantage of **Circulair** is a joy forever in every case but especially in beneath-the-window installations, where the dainty curtains or draperies above are saved from the soil and grime which has been the wintertide vexation of every good housekeeper. And it should be remembered that this advantage, inherent in **Circulair**, is so great that many distracted owners of "radiator"-equipped buildings have turned to the expedient of the "radiator cabinet" in order to secure it in some measure, despite the fact that such enclosures may reduce the heating capacity of a "radiator" as much as 40 per cent.



*Since Cleanliness is next to Godliness the Bath Room is the Shrine of the Home. In this one Concealed **Circulair** affords luxurious Comfort, yet precludes painful burns and usurps no space at all.*



Construction Details of *Circulair*

THE cast bronze union-fittings at the ends of the heat unit itself, as previously described, are made square, as shown, and slots are accurately machined in all four sides. The slotted fitting, in either the vertical ($3\frac{3}{8}$ in. deep) or horizontal ($6\frac{3}{4}$ in. deep) position, is then set into heavy pressed steel end plates, the bottom and two side slots engaging snugly, as shown in the photographs. The die-stamped end plate of the damper housing locks the slotted fitting securely in position, and the back plate, with its curved entering air deflector at the bottom, together with the beaded front panel, constitute a rigid, sturdy, die-accurate steel casing which completely protects the heat element in shipping, handling and connection,—a **Circulair** feature of great practical importance.

The strong steel end plates take *all* the strains of pipe connection, precluding injury during installation and from the weight or expansion of the piping in service.

Thus the advantages of the **Circulair** heat element are permanently sealed into the unit, safe from injury or the loss of efficiency which would occur if the scientifically spaced extended surface were subject to deformation in handling or connection.

The heat control damper is set into the upper housing as an integral part of the unit. It is provided with a flexible edging, insuring tight closure, and is carried on a rigid square rod which extends through the casing at both ends.

In heater units for Concealed installations the damper rod is provided with sector gears, actuated by a knob which protrudes through the front of the lower grille, as shown. The knob is attractively die-cast and permanently finished in baked black enamel. It has a square hole and is locked to the square damper or gear rod by means of a set screw.

In the Cabinet Types of **Circulair** the damper rod is usually extended through one end of the Cabinet casing (either end desired), and the knob affixed directly to the end of the rod. In instances where the Cabinet is placed in an offset or niche where there is not sufficient room for the knob to be extended through the end of the casing, the gear set may be employed, placing the knob in front of the Cabinet as with a Concealed unit. This requires perforation of the front Cabinet panel and must be ordered especially when required.

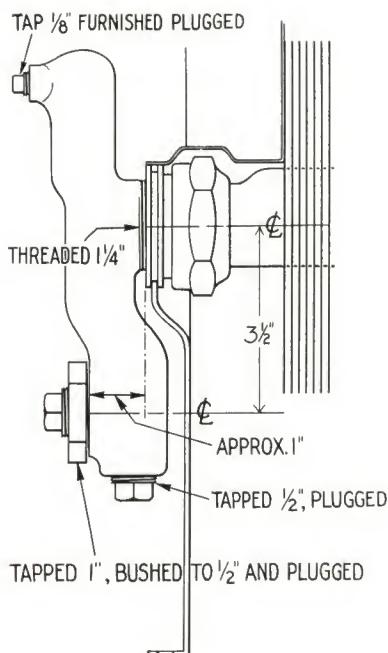


Fig. 4. Dimensional Detail of Cast Bronze Outlet Fitting.



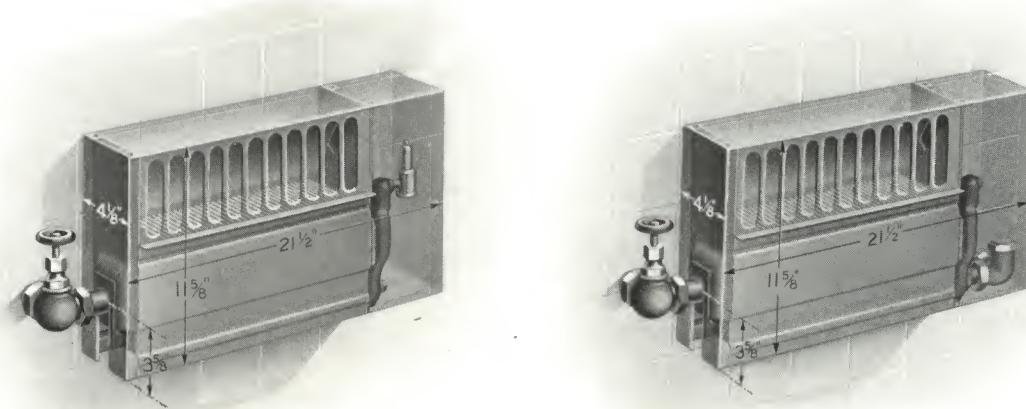
Whatever the placement of the knob, with or without the gear mechanism, the damper will remain in any position due to the slight, but ample, friction of the flexible edging.

The cast bronze outlet fitting shown is furnished as a standard part of the heater unit. It is tapped $1\frac{1}{4}$ in. at the center and may therefore be used on either end of the unit, both ends of which have $1\frac{1}{4}$ in. female thread. The upper tapping is $\frac{1}{8}$ in. for standard air valve and the lower side tapping is 1 in. for return line connection, when desired. There is also a $\frac{1}{2}$ in. bottom clean-out tapping. The bronze outlet fitting is furnished with the upper $\frac{1}{8}$ in. air valve tapping and the bottom $\frac{1}{2}$ in. clean-out tapping plugged, while the 1 in. horizontal drip tapping is furnished with 1 to $\frac{1}{2}$ in. bushing and $\frac{1}{2}$ in. plug.

The $1\frac{1}{4}$ in. tapping at the supply end of the heater unit is bushed to 1 in.

Thus the standard heater unit meets practically any requirement and the contractor is saved the bother of specifying or providing bushings and plugs. For special jobs where other bushings are desired these will be furnished as specified.

The special outlet fitting is another feature of **Circulair** which adds to its operating satisfaction, since it avoids sputtering or spitting of the air valve, insures free venting of air and release of condensation. The sturdy casting provides a dependable, convenient, accessible, leak-proof tapping for the air valve, either plain or syphon type.



Circulair Bath Room Units for exterior installation beneath Wash Basins or in other out-of-the-way places. Left, One-Pipe Steam System, Air Valve enclosed in Casing. Right, Two-Pipe System, Trap enclosed in Casing. Casings shown in phantom. Detailed Information upon request.



Concealed *Circulair*

CONCEALED **Circulair** equipment furnished includes the heater unit with its integral damper and gear set, and its special outlet fitting, and two grilles, the lower entering air grille and the upper heated air grille.

The lower grille plate is punched for passage of damper knob rod and is sufficiently high to afford complete access to the heater unit, or its removal, if required for any purpose,—another distinctive **Circulair** feature. As priorly mentioned the grille openings do not extend to the bottom of the plate but end an inch above the floor, preventing the ingress of dirt when the floor is being swept, and the plate closes what would otherwise become a narrow difficulty cleaned recess. Further, **Circulair** design avoids the necessity of finishing the floor behind the wall line.

The upper grille frame contains the integral deflector, carefully designed to avoid resistance to the air flow, and is flanged at the bottom, to simplify the connection of the stack. The metal flue connection is easily made on the job according to standard practice or details which we will furnish upon request. It is suggested that wood-pulp wall board may be used effectively in the construction of flues, instead of metal, due to its smooth surface and excellent insulating properties. If such board is used its thickness may be subtracted from that of the insulation recommended between a **Circulair** flue and an outer wall.

Unless especially ordered otherwise, lower and upper grilles will be furnished with one flat prime paint coat for finishing after installation.

Cabinet Types

BOTH the short deep Cabinets and the tall shallow Cabinets are complete units which are set over the separate heater unit, after it is installed, hence their removal affords full access to the heater unit, if required.

Note that the Cabinet completely encloses the heater unit except at the front, avoiding dirt pockets and concealing the piping.

Standard finish for Cabinets is one flat prime paint coat, for finishing after installation, but any desired wood grain or other finish, including white, for hospitals, bath rooms or similar purposes, will be furnished on special order.



Installation of Concealed *Circulair*

THE Concealed *Circulair* heater unit may be installed before or after the wall is finished, since the lower removable grille plate affords complete access. Usually the lower and upper grille frames and the connecting flue are placed in position and either plastered or paneled in as the wall is finished,—a simple, inexpensive operation.

When Concealed *Circulair* is installed in outer walls the outer wall surface should be insulated to prevent waste of heat and insure full capacity of the unit by avoiding any diminution of stack effect due to chilling of the rising air in the flue. At least $\frac{1}{2}$ in. of good insulation material should be used.

The separate, amazingly light-weight heater unit makes installation inexpensive, simple and quick. Even delivery delays are unimportant, since the heater unit may be easily installed *after* the wall is finished, when required.

Besides ease of handling on the job, with its resulting economy and dispatch, the light-weight of *Circulair* is a factor of great importance in building design, materially reducing the total load, as compared with cast iron "radiators."

A 48-in. *Circulair* heater unit, with heat element horizontal, set in a 70-in. stack, affords heating capacity equivalent to 100 sq. ft. of cast iron "radiation." The *Circulair* heater unit (exclusive of the grilles and stack) weighs 54 lbs! Equivalent cast iron would weigh from 550 to 700 lbs.! More than ten times the weight of the *Circulair* unit!

In tall buildings the saving in weight is enormous, as every Architect and Engineer will at once appreciate.

Even in the modest residence the light-weight of *Circulair* is important, not only because of the handling ease and the reduction in floor load, but because it avoids the sagging of the floors and the separation of the baseboards, familiar difficulties in houses equipped with heavy cast iron.

Detailed weights of grilles and Cabinets are shown in Price Lists which will be forwarded upon request.

Engineering Cooperation

The possibilities of *Circulair* are so manifold that many applications will occur in practice which have not been discussed in this Bulletin. We shall be delighted to cooperate with any Architect, Engineer or Contractor in the development of such special applications and we invite correspondence to that end.

50 Church Street
New York

Circulair Heat, Inc.
215 Central Avenue
Louisville, Kentucky

1916 Builders Bldg.
Chicago

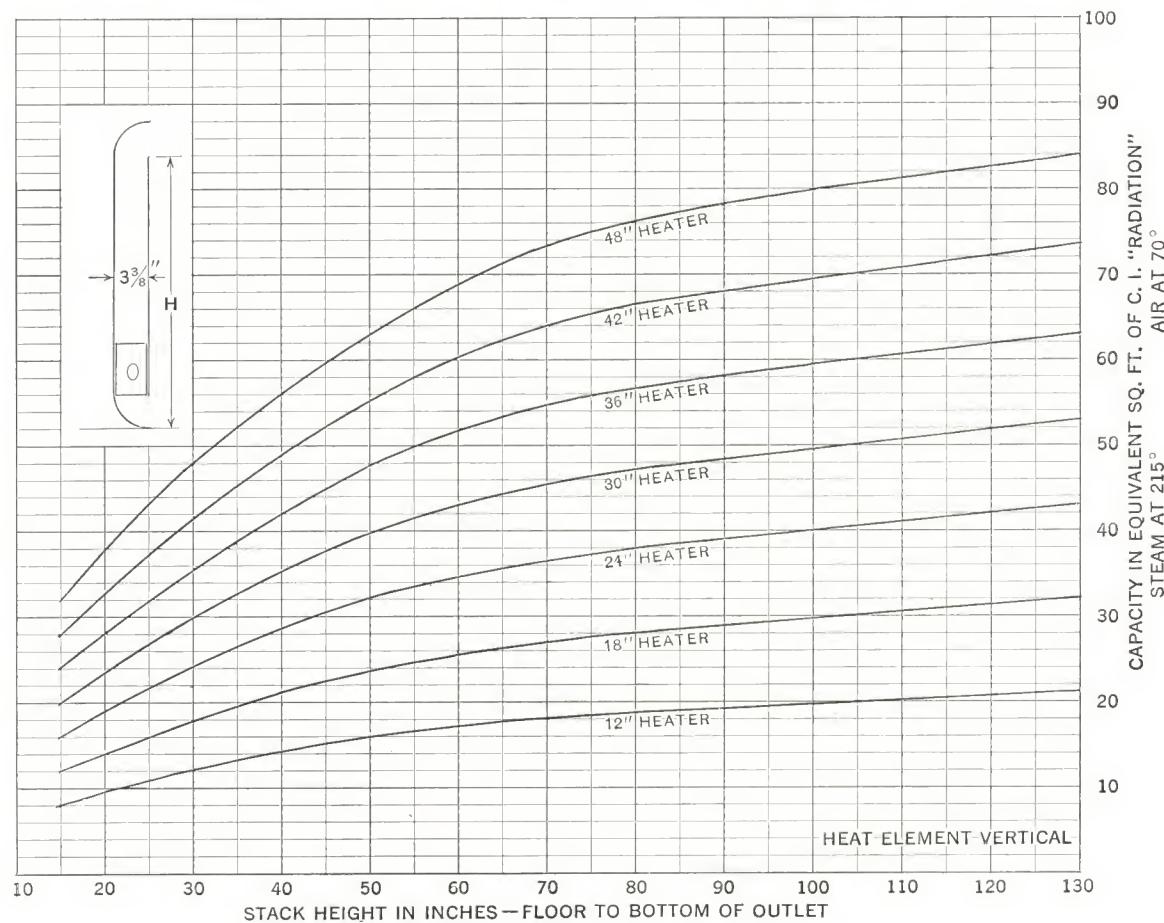


Sizes, Capacities and Dimensions of *Circulair*

both Concealed and Cabinet Types are shown in the following drawings, Graphs and Tables.

Note that the capacity of the unit, per inch of stack height, Graphs Pgs. 38 and 39, begins to decline more rapidly at a height of about 70 in. and that this is, therefore, an

**Capacities of Vertical *Circulair* Units at Various Stack Heights in
Equivalent Sq. Ft. of Cast Iron Direct "Radiation"**

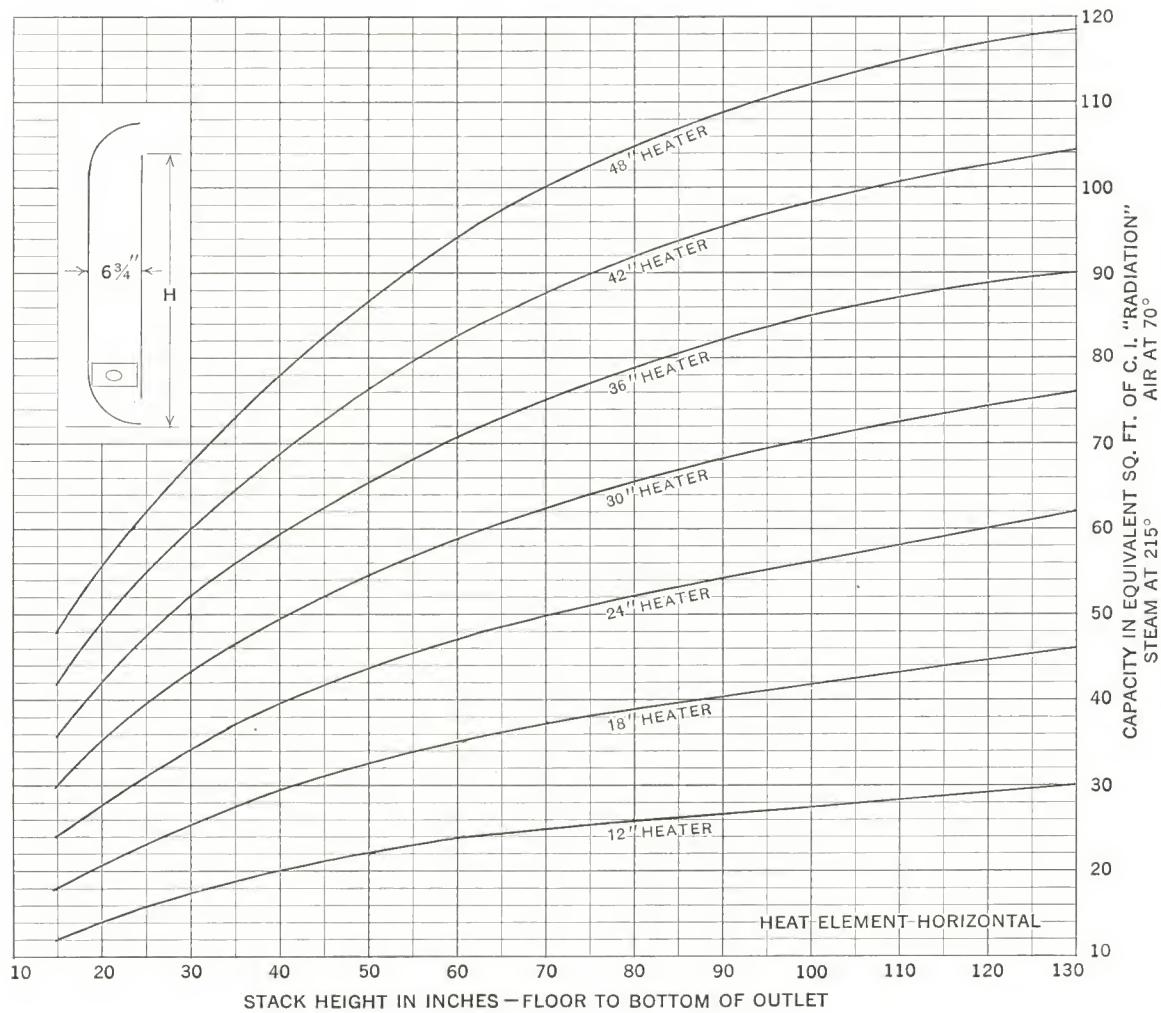




especially desirable selection, since it meets other requirements also. It is advisable of course, to select sizes approximating these maximal stack heights, when possible.

For low beneath-window units, whether Concealed or Cabinet, use the $6\frac{3}{4}$ in. horizontal element unit if practicable.

Capacities of Horizontal *Circulair* Units at Various Stack Heights in Equivalent Sq. Ft. of Cast Iron Direct "Radiation"





B.t.u. Transmitted and Equivalent Sq. Ft. Cast Iron Direct "Radiation"
Heat Element set Vertically (3³/₈" deep)—Concealed or Tall Cabinet Types

Steam at 215° F.

STACK HEIGHT IN.	Size 12"		Size 18"		Size 24"		Size 30"		Size 36"		Size 42"		Size 48"	
	(12" HEAT ELEMENT)	Equiv. B.t.u. per Hr. Air at 60°	Equiv. B.t.u. per Hr. Cast Iron "Rad."											
15	2090	8.0	3140	2880	12.0	4180	3840	16.0	5230	4800	20.0	6270	5760	24.0
20	2440	9.3	3660	3360	14.0	4880	4480	18.6	6100	5600	23.3	7320	6730	28.0
25	2790	10.7	4190	3850	16.0	5580	5120	21.1	6980	6420	26.7	8370	7680	32.0
30	3140	12.0	4710	4320	18.0	6280	5760	24.0	7850	7200	30.0	9420	8640	37.3
35	3420	13.1	5130	4710	19.6	6840	6280	26.2	8550	7860	32.7	10260	9420	42.3
40	3720	14.2	5580	5110	21.2	7440	6820	28.4	9300	8520	35.5	11160	10230	47.7
45	3980	15.2	5970	5470	22.8	7960	7300	30.4	9950	9120	38.0	11940	10950	52.4
50	4170	15.9	6260	5720	23.8	8340	7640	31.8	10430	9540	39.7	12510	11460	56.8
55	4400	16.8	6600	6050	25.2	8800	8060	33.0	11000	10080	42.0	13200	12090	60.8
60	4580	17.0	6870	6120	26.0	9160	8160	34.0	11450	10200	43.3	13740	12240	64.0
65	4680	17.9	7020	6440	26.8	9360	8590	35.8	11700	10740	44.7	14040	12870	71.6
70	4800	18.3	7200	6590	27.4	9600	8780	36.6	12000	10980	45.7	14400	13170	73.2
75	4900	18.7	7350	6730	28.0	9800	8980	37.4	12250	11220	46.7	14700	13470	74.8
80	4970	19.0	7460	6840	28.5	9940	9120	38.0	12420	11400	47.5	14910	13680	76.0
85	5060	19.2	7590	6910	28.8	10120	9280	38.4	12650	11520	48.0	15180	13920	76.8

Table No. 2

B.t.u. Transmitted and Equivalent Sq. Ft. Cast Iron Direct "Radiation"
Heat Element set Horizontally (6³/₄" deep) - Concealed Type

Steam at 215° F.

STACK HEIGHT IN.	Size 12"				Size 18"				Size 24"				Size 30"				Size 36"				Size 42"			
	(12" HEAT ELEMENT)		(18" HEAT ELEMENT)		(24" HEAT ELEMENT)		(30" HEAT ELEMENT)		(36" HEAT ELEMENT)		(42" HEAT ELEMENT)		(48" HEAT ELEMENT)											
	B.t.u. per Hr. per Sq. Ft. per Hr. Air at 60°	B.t.u. per Hr. per Sq. Ft. per Hr. Air at 70°	Equiv. B.t.u. per Hr. per Sq. Ft. Cast Iron "Rad."	B.t.u. per Hr. per Hr. Air at 60°	Equiv. B.t.u. per Hr. per Hr. Air at 70°	B.t.u. per Hr. per Hr. Air at 60°	Equiv. B.t.u. per Hr. per Hr. Air at 70°	B.t.u. per Hr. per Hr. Air at 60°	Equiv. B.t.u. per Hr. per Hr. Cast Iron "Rad."	B.t.u. per Hr. per Hr. Air at 60°	Equiv. B.t.u. per Hr. per Hr. Cast Iron "Rad."	B.t.u. per Hr. per Hr. Air at 60°	Equiv. B.t.u. per Hr. per Hr. Cast Iron "Rad."	B.t.u. per Hr. per Hr. Air at 60°	Equiv. B.t.u. per Hr. per Hr. Cast Iron "Rad."	B.t.u. per Hr. per Hr. Air at 60°	Equiv. B.t.u. per Hr. per Hr. Cast Iron "Rad."	B.t.u. per Hr. per Hr. Air at 60°	Equiv. B.t.u. per Hr. per Hr. Cast Iron "Rad."	B.t.u. per Hr. per Hr. Air at 60°	Equiv. B.t.u. per Hr. per Hr. Cast Iron "Rad."			
15	3140	2880	12.0	4710	4320	18.0	6280	5760	24.0	7850	7200	30.0	9420	8640	36.0	10990	10080	42.0	12560	11520	48.0			
20	3690	3380	14.2	5535	5070	21.3	7380	6760	28.4	9225	8450	35.5	11070	10140	42.5	12915	11830	49.6	14760	13520	56.8			
25	4130	3790	15.8	6195	5685	23.7	8260	7580	31.6	10325	9475	39.5	12390	11375	47.4	14455	13270	55.3	16520	16160	63.2			
30	4530	4150	17.3	6795	6225	26.0	9060	8300	34.6	11325	10375	43.3	13590	12450	51.8	15855	1425	60.5	18120	16600	69.2			
35	4840	4440	18.5	7260	6660	27.8	9680	8880	37.0	12100	11100	46.3	14520	13320	55.5	16940	15540	64.8	19360	17760	74.0			
40	5170	4730	19.7	7755	7095	29.6	10340	9460	39.4	12925	11825	49.3	15510	14190	59.1	18095	16555	69.0	20640	18920	78.8			
45	5450	4990	20.8	8175	7485	31.2	10900	9980	41.6	13625	12475	52.0	16350	14970	62.4	19075	17465	72.8	21800	19960	83.2			
50	5720	5230	21.8	8580	7845	32.7	11440	10460	43.6	14300	13075	54.5	17160	15690	65.4	20020	18305	76.3	22880	20920	87.2			
55	5950	5450	22.7	8925	8175	34.1	11900	10900	44.8	14875	13625	56.2	17850	16350	68.2	20825	19075	79.6	23800	21800	89.6			
60	6180	5670	23.6	9270	8505	35.4	12360	11340	47.2	15450	14175	59.0	18540	17010	70.8	21630	19845	82.6	24720	22680	94.4			
65	6460	5910	24.6	9690	8865	36.9	12920	11820	49.2	16150	14775	61.5	19380	17730	73.2	22610	20685	85.5	25840	23740	98.4			
70	6610	6050	25.1	9915	9075	37.7	13220	12100	50.1	16525	15125	62.7	19830	18150	75.4	23135	21175	88.0	26440	24200	100.2			
75	6760	6190	25.8	10140	9285	38.7	13520	12380	51.6	16900	15475	64.5	20280	18570	77.4	23660	21665	90.3	27040	24760	103.2			
80	6840	6270	26.1	10260	9405	39.2	13680	12540	52.2	17100	15675	65.3	20520	18810	78.4	23940	21945	91.5	27360	25080	104.4			



**Table No. 3—Regular Cabinets
B.t.u. Transmitted, Equivalent Sq. Ft. Cast Iron Direct
“Radiation”, Dimensions and Weights
Heat Element Horizontal (6 3/4" deep)
Steam at 215°—Air at 70°**

SIZE 12" 12" HEAT ELEMENT		DIMENSIONS OF CABINET, OVERALL			STACK HEIGHT INCHES FLOOR TO BOTTOM OUTLET GRILLE	NET WEIGHT CABINET ALONE LBS.	SHIPPING WEIGHT CABINET ALONE LBS.	NET WEIGHT CABINET AND HEATER UNIT LBS.	SIZE 18" 18" HEAT ELEMENT		DIMENSIONS OF CABINET, OVERALL			NET WEIGHT CABINET ALONE LBS.	SHIPPING WEIGHT CABINET ALONE LBS.	NET WEIGHT CABINET AND HEATER UNIT LBS.	
B.t.u. per Hr. Air at 70°	Equivalent Sq. Ft. Cast Iron “Rad.”	Height In.	Width In.	Depth In.					B.t.u. per Hr. Air at 70°	Equivalent Sq. Ft. Cast Iron “Rad.”	Height In.	Width In.	Depth In.				
2880	12.0	21	31	9	15	25	42	43½	4320	18.0	21	37	9	28¾	48	54	
3528	14.7	27	31	9	21	28¼	46¼	47	5290	22.0	27	37	9	33	53	58	
4392	18.3	38	31	9	32	36¼	56¼	55	6588	27.5	38	37	9	42	65	67	
SIZE 24" 24" HEAT ELEMENT								SIZE 30" 30" HEAT ELEMENT									
5760	24.0	21	43	9	15	32½	52½	62½	7200	30.0	21	49	9	36¼	58½	72	
7056	29.4	27	43	9	21	38	60	68	8820	36.7	27	49	9	42¾	67	79	
8784	36.6	38	43	9	32	47½	72½	77½	10980	45.7	38	49	9	53½	81½	89½	
SIZE 36" 36" HEAT ELEMENT								SIZE 42" 42" HEAT ELEMENT									
8640	36.0	21	55	9	15	41	65	82½	10080	42.0	21	61	9	44¾	71	92	
10584	44.1	27	55	9	21	47½	73½	89	12350	51.5	27	61	9	52¼	80½	99	
13176	55.0	38	55	9	32	60	90	101	15370	64.0	38	61	9	66	99	113	
SIZE 48" 48" HEAT ELEMENT		DIMENSIONS OF CABINET, OVERALL			STACK HEIGHT INCHES FLOOR TO BOTTOM OUTLET GRILLE		NET WEIGHT CABINET ALONE LBS.		SHIPPING WEIGHT CABINET ALONE LBS.		NET WEIGHT CABINET AND HEATER UNIT LBS.						
B.t.u per Hr. Air at 70°	Equivalent Sq. Ft. Cast Iron “Radiation”	Height In.	Width In.	Depth In.	15	49	77	102									
11520	48.0	21	67	9	21	57	88	110									
14112	58.8	27	67	9	32	72	107	125									
17568	73.2	38	67	9													

**Table No. 4—Tall Cabinet Type, Dimensions and Weights
*Heat Element Vertical (3 3/8" deep)***

(Capacities from Table 1)

Overall Height of Cabinet is Stack Height (as selected from Table 1) plus 6 in.

Overall Width of Cabinet is Length of Heat Element plus 19 in. (including 1 in. Top Cover extension on each side.)

Depth of Cabinet is 4 in.

Damper Knob may be placed at either end or, on special order where necessary, may be extended thru front panel as in Concealed Type.

**Weights of 80" Stack Height Cabinet (87" high,
overall,) with Increments for other Heights**

SIZE (LENGTH OF HEAT ELEMENT) INCHES	NET WEIGHT CABINET POUNDS	SHIPPING WEIGHT CABINET POUNDS	ADD OR DEDUCT FOR EACH INCH OF HEIGHT POUNDS
12	90	130	1.0
18	105	150	1.14
24	120	165	1.32
30	135	180	1.49
36	150	195	1.66
42	165	210	1.83
48	180	225	2.01

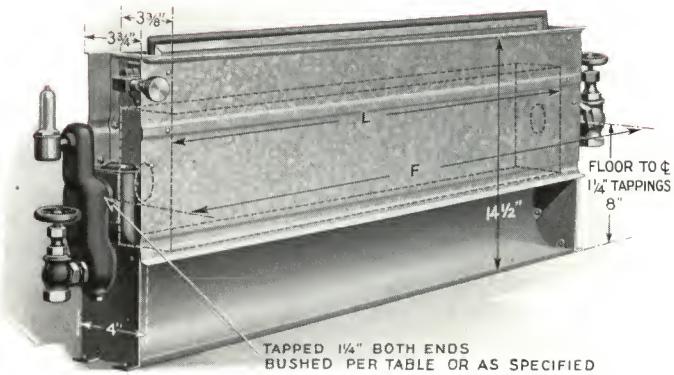


Fig. 5

Table No. 5

Dimensions and Weights Heater Units and Concealed Type Grilles

Heat Element set Vertically (3 3/8" deep)

This Table Refers to Fig. 5

(For Outlet Tappings and Bushings see Fig. 4)

SIZE (LENGTH OF HEAT ELEMENT) INCHES <i>L</i>	FACE TO FACE OF TAPPING FLANGES INCHES <i>F</i>	GRILLE FRAME DIMENSIONS (WALL OPENINGS REQUIRED†)				NET WEIGHT HEATER UNIT COMPLETE INCLUDING DAMPER AND OUTLET FITTING POUNDS	SHIPPING WEIGHT HEATER UNIT COMPLETE POUNDS	NET WEIGHT ONE PAIR LOWER AND UPPER GRILLES COMPLETE INCLUDING FRAMES POUNDS	SHIPPING WEIGHT ONE PAIR LOWER AND UPPER GRILLES AND FRAMES POUNDS				
		Lower Inlet Grille		Upper Outlet Grille									
		Width of Angle Iron Frame* (<i>L</i> + 18") Inches	Height of Angle Iron Frame Inches	Width of Angle Iron Frame** (<i>L</i> + 18") Inches	Height of Angle Iron Frame Inches								
12	17 1/8	30	14 7/8	30	6 1/2	18	21	15	30				
18	23 1/8	36	14 7/8	36	6 1/2	24	28	17 1/2	34				
24	29 1/8	42	14 7/8	42	6 1/2	30	35	20	38				
30	35 1/8	48	14 7/8	48	6 1/2	35	42	22 1/2	42				
36	41 1/8	54	14 7/8	54	6 1/2	40	49	25	46				
42	47 1/8	60	14 7/8	60	6 1/2	46	56	27 1/2	50				
48	53 1/8	66	14 7/8	66	6 1/2	51	63	30	54				

*Lower Grille Panel itself is $\frac{1}{4}$ in. wider and $\frac{1}{8}$ in. higher than angle iron frame, frame and panel aligning at floor.

**Upper Grille Panel itself is $\frac{1}{4}$ in. wider and higher than angle iron frame, hence extends $\frac{1}{8}$ in. over angle frame, all around.

†Overall Height, to top of Outlet Grille, i.e., Height Wall Opening required, is Stack Height plus 6 in.

Length connecting Stack between Heater Unit and bottom flanges of upper Grille head is Stack Height minus 14 1/2 in. minus 1 1/2 in.

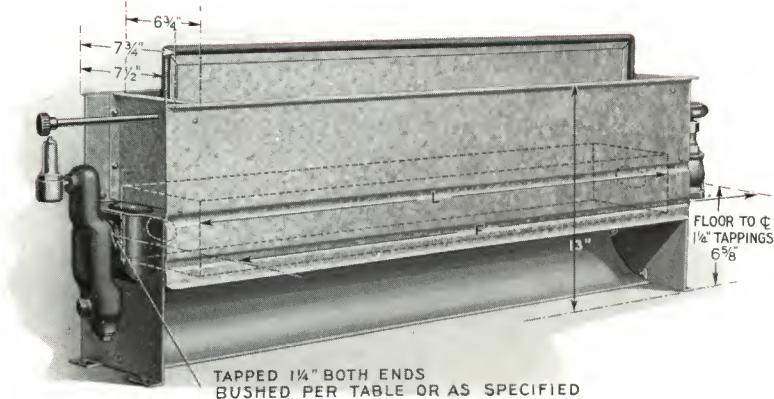


Fig. 6

Table No. 6
Dimensions and Weights Heater Units and Concealed
Type Grilles
Heat Element set Horizontally (6 3/4" deep)
 This Table Refers to Fig. 6
 (For Outlet Tappings and Bushings see Fig. 4)

SIZE (LENGTH OF HEAT ELEMENT) INCHES <i>L</i>	FACE TO FACE OF TAPPING FLANGES INCHES <i>F</i>	GRILLE FRAME DIMENSIONS (WALL OPENINGS REQUIRED)				NET WEIGHT HEATER UNIT COMPLETE INCLUDING DAMPER, AND OUTLET FITTING POUNDS	SHIPPING WEIGHT HEATER UNIT COMPLETE POUNDS	NET WEIGHT ONE PAIR LOWER AND UPPER GRILLES COMPLETE INCLUDING FRAMES POUNDS	SHIPPING WEIGHT ONE PAIR LOWER AND UPPER GRILLES AND FRAMES POUNDS				
		Lower Inlet Grille		Upper Outlet Grille									
		Width of Angle Iron Frame* (<i>L</i> + 18") Inches	Height of Angle Iron Frame Inches	Width of Angle Iron Frame** (<i>L</i> + 18") Inches	Height of Angle Iron Frame Inches								
12	17 1/8	30	14 7/8	30	6 1/2	18 1/2	22	15	30				
18	23 1/8	36	14 7/8	36	6 1/2	25	29	17 1/2	34				
24	29 1/8	42	14 7/8	42	6 1/2	30	36	20	38				
30	35 1/8	48	14 7/8	48	6 1/2	36	43	22 1/2	42				
36	41 1/8	54	14 7/8	54	6 1/2	42	50	25	46				
42	47 1/8	60	14 7/8	60	6 1/2	48	57	27 1/2	50				
48	53 1/8	66	14 7/8	66	6 1/2	53	65	30	54				

*Lower Grille Panel itself is $\frac{1}{4}$ in. wider and $\frac{1}{8}$ in. higher than angle iron frame, frame and panel aligning at floor.

**Upper Grille Panel itself is $\frac{1}{4}$ in. wider and higher than angle iron frame, hence extends $\frac{1}{8}$ in. over angle frame, all around.

†Overall Height, to top of Outlet Grille, i.e., Height Wall Opening required, is Stack Height plus 6 in.

Length connecting Stack between Heater Unit and bottom flanges of upper Grille head is Stack Height minus 13 in. minus $1\frac{1}{2}$ in.



